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Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fifth year of publication, with 3200+ subscribers.

About Zero Retries

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My thanks to **Prefers to Remain Anonymous 99** for *upgrading* from a free subscriber to Zero Retries to an **Annual Paid Subscriber** this past week!

My thanks to **Prefers to Remain Anonymous 100** for becoming a *new* **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 50** for starting their second year of being a **Paid Subscriber** to Zero Retries as of this past week!

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Severely Abbreviated Issue

I attended GNU Radio Conference 2025 all this week, and of necessity, I've spent most of my limited non-GRCon 2025 time dealing with ZRDC writing and other work that had to be completed prior to ZRDC.

And a *little* bit of sleep.

So of necessity, this issue of Zero Retries will be abbreviated, with much more detail in next week's issue when I have reasonable blocks of time to process and write.

Tina encouraged me not to attempt any kind of Zero Retries issue today given the pressing last minute matters of ZRDC. So we compromised - this won't be much of an issue, but at least I'll publish something that reflects a bit of what I learned this week at GNU Radio Conference 2025.

Thanks,

Steve N8GNJ

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Observations from GNU Radio Conference 2025 - *Tersely*

By Steve Stroh N8GNJ

What follows are mostly impressions and interpretations, terse, and incomplete, and perhaps wrong in some ways. But I wanted to publish something… because it's Friday and Zero Retries publishes on Friday.

It's hard to distill the experience of an entire week of GNU Radio Conference into mere text. Especially from my perspective of a first time attendee combined with my involvement behind the scenes. Mostly that's because of the intensity and the depth of content of this conference.

What's sobering is that GRCon 2025 is considered about "half size" given all the travel issues attending of an event in the US with the challenges of travel from outside the US. One of the "big" GRCon events would be a bit overwhelming for someone like me.

One key takeaway of GRCon about GNU Radio is that using radio technology for communications is only one of many applications for GNU Radio and Software Defined Radio technology in general. There's RADAR (air, indoor, and ground penetrating), and signals intelligence, and electronic warfare, and (very) adaptive communications, and (civilian) situational awareness, and R&D… and… and…

I met a few people from *I can't really talk about it* organizations that were attending GRCon 2025 because GNU Radio is a very important part of their jobs and a critical technology for their organizations. 'Nuff said on that.

Amateur Radio is Widely Known in GNU Radio

It was surprising and gratifying is that Amateur Radio was kind of an "underlay" to many GRCon attendees (and apparently much more widespread in the GNU Radio Community than I was aware of). I was told that perhaps 50% of those involved in GNU Radio are Amateur Radio licensees.

The rest of the GNU Radio community are aware that Amateur Radio is available as a resource (it sounded like everyone at the conference knew someone else professionally that was an Amateur Radio Operator) but they haven't quite made the leap of the utility of Amateur Radio to them personally. But they're willing to be convinced, and I saw more than a few eyes light up in conversations about why Amateur Radio could be useful to them.

Almost entirely for the purposes I've outlined here in Zero Retries describing NewTechHams - personal and some professional hands on experimentation with radio technology being able to use transmit power levels and spectrum that you can't do (legally) without and Amateur Radio (or other commercial or experimental) license.

It was interesting and refreshing to describe NewTechHams to the GRCon attendees and they kind of looked at me like… well, yeah. Of course!

But describing the activities of NewTechHams to typical Amateur Radio Operators results mostly in a blank stare. It's like a Venn diagram, where the overlap between NewTechHams and typical Amateur Radio is perhaps 20%.

GNU Radio is (Now) Foundational to Any / All Radio Technology Development

Another key takeaway was that *any* product development or research in the last decade now *starts* with GNU Radio. GR is *the foundation technology* of radio technology development now. It just doesn't make sense to do it any other way because the GNU Radio ecosystem is so wide and deep. Just as electronic hardware development has transitioned into microprocessor / microcontroller plus ancillary hardware, but mostly software, radio technology is now almost totally software, other than the "final bits" of radio hardware such as power amplifiers, brute force filters, etc.

New GNU Radio - 4.0

And the level of intensity and capability is about to ratchet up several notches in the coming years with the advent of GNU Radio 4.0. As I understand it, GNU Radio 4.0 is practically a restart of GNU Radio on three major "forks" from GNU Radio 3.x:

- The software license will almost certainly change from "Copyleft" in GNU Radio prior to 4.0, to 4.0 being licensed with the "MIT" license. Meaning[1] that having to publish your changes to GNU Radio for your product will no longer be required. This will make GNU Radio much more palatable (and thus much more widespread) to use in products, especially high value complex products and projects.

- GNU Radio 4.0 and later will be streamlined and improved to be a runtime environment instead of a prototyping system. It will be much more normal that a product will run GNU Radio behind the scenes very similar to the way Linux is embedded in so many products, but you never see any overt hint that a product is operating with Linux behind the scenes.

- GNU Radio 4.0 and later will be designed for the Artificial Intelligence (AI) era. Not in the sense of Machine Learning - that's been in existence for quite some time, but rather to design new radio systems with the assistance of AI. I don't quite understand the nuances of this, but it will be far easier for an AI to create new radio technology with GNU Radio 4.0 and later than was possible with GNU Radio prior to 4.0.

Despite the successive numbering system of 3.x and 4.x, as I understand it, GNU Radio 4.x is a fork. If the phrasing wasn't so awkward, I'd be tempted to use the terminology of GNU Radio 4.0 as *New* GNU Radio. Or maybe… GNU Radio - The Next Generation? Naw… too Star Trek-ey.

LinHT

One fun experience was doing a 5 minute Lightning Talk on Thursday about the LinHT. I was fortunate that Wojciech Kaczmarski SP5WWP had sent me his slide deck for his presentation about the LinHT that he did at M17 Conference 2025 the previous weekend. With only 5 minutes, I was brief and only showed a few of SP5WWP's slides (with full credit to him). With the exhibit hall showcasing Software Defined Radio products of which the least expensive was more than $1,000… that I (on behalf of Amateur Radio and M17 Project / Foundation) was able to show off a much more (potentially) practical and (potentially) very affordable Software Defined Transceiver that could natively run GNU Radio on the device. I think that made the connection in the minds of a lot of the attendees that had not previously given much thought to Amateur Radio.

It was pointed out to me later that the LinHT initially will operate on the Amateur Radio 420-450 MHz band (that's the US version), but in Europe, 433 MHz is an unlicensed band, and thus GNU Radio experimenters in Europe could use the LinHT without the need of an Amateur Radio license.

4 NewTechHams from GRCon 2025

I was asked to arrange for Amateur Radio license testing at GRCon 2025. I reached out to several Laurel VEC teams in the Seattle area, and I was grateful to the Western Washington Ham Training Team (WWHTT), led by Daniel Stevens KL7WM for responding so well to my request, and being gracious despite a few organizational hiccups in getting the session scheduled.

There are now four new "GNU Radio Hams" now - Technician Class, who have *started their experience with Amateur Radio* with the technology basis of knowing and understanding radio technology from working with GNU Radio. In addition to the four Techs, one person upgraded to General, and another upgraded to Extra.

My favorite story from the GRCon 2025 Amateur Radio test session is a teacher from a major city who was attending GRCon 2025 because they were considering setting up a wireless curriculum in their system. At the Wednesday evening social gathering I mentioned Amateur Radio and the teacher knew nothing about it. I explained briefly, and also mentioned the testing session the next day and explained that they needed to get their Federal Registration Number in advance of the test, and that if they passed they'd need to pay the FCC $35 fee before they received their callsign. The teacher was one of those that got their Technician license. From first encounter with Amateur Radio to becoming licensed in under 24 hours.

Meeting of the GNU Radio Hams

I requested and was given a one hour time slot for a brief meetup of attendees that were Amateur Radio Operators and wanted to "chat about Ham Radio". By the time this time slot happened on Friday afternoon, I had a much better understanding of Amateur Radio's positioning within the GNU Radio ecosystem and community.

I asked for the attendees (packed room - about 25 or so) to brainstorm whether it should be attempted to more closely couple "NewTechHams" (Zero Retries Interesting) aspects of Amateur Radio into the GNU Radio community and ecosystem.

The resounding answer was Yes, and then we discussed how to do so. Right now the notes from that session are a jumble of random notes that I was working hard to capture, and hopefully by next week I'll have some coherence to those notes with kind of an action plan.

Maybe (Probably) Bigger Amateur Radio Presence at GRCon 2026

One discussion thread from the meeting is that it's ambitious, but probably doable, and desirable, especially with a year to plan of a larger, more formal presence of Amateur Radio at future GRCon events beginning in 2026. I and many in attendance at the GNU Radio Hams meeting think that there's a lot to be gained, for both Amateur Radio and GNU Radio to have a more deliberate presence and hands on activities at GNU Radio 2026.

It was pointed out that GNU Radio Days Europe, and GNU Radio Days Australia have both featured Amateur Radio more than GRCon has. And that there has been more Amateur Radio involvement in previous GRCons, including FlexRadio attending one year.

I think it's more likely than not that I will be involved… perhaps leading… such a project for

GRCon 2026.

GRCon / Amateur Radio Mic Drop Moment

There was a moment during the GNU Radio Hams meetup that remains etched in my mind. We were discussing the relevance of Amateur Radio to younger folks, as in "try to get them interested no later than their mid-teens".

One attendee made the very valid point that at that age, parental support, especially financial, is critical. You can't blame a parent for the bottom line question of "why should I pay for this kind of hobby activity"?

That led to a discussion that for many attendees, getting involved in Amateur Radio led to a career in radio technology and use of GNU Radio to do more advanced things.

Then the mic drop from one attendee (and this is severely paraphrased):

> I get contacted all the time asking if I know anyone with experience with GNU Radio that's looking for a job. I always reply:
>
> No, I don't know anyone in the GNU Radio community that's looking for work.
>
> *Everyone I know in the GNU Radio community already has a good job*.

The GRCon attendees just kind of nodded in acknowledgement.

Those, like me, who haven't been previously involved in GNU Radio… were briefly dumbfounded. In this economy, in this rapidly evolving technology climate, to state something so categorically like "knowing GNU Radio is a pretty sure pathway to a good, interesting, challenging, and probably well-paying job"… is impressive.

Want a good, interesting, well paying job with a good future? Start learning GNU Radio and get your Amateur Radio license.

The career aspect of knowing GNU Radio plus Amateur Radio involvement was emphasized by an earlier speaker being asked about how to get a job at the speaker's company. The speaker said that they ignore resumes, LinkedIn profiles, etc. They said that what was relevant to getting hired at their company was proof of accomplishment - take on a project and prove something out, develop something new, try something interesting, even if it doesn't work. That demonstrates curiosity and willingness to learn and experiment. Oh, and all of that is irrelevant if you cannot document what you accomplished so that your accomplishment can be understood by others.

That sounds like a great description of the combination of GNU Radio and Amateur Radio.

Again, much, much more in next week's Zero Retries.

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These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

See the **Zero Retries Boilerplate** page for significant acknowledgements and other information relevant to Zero Retries. For new readers of Zero Retries, that page, and the **About Zero Retries** page has useful information to check out.

My ongoing ***Thanks*** to:
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Shreky Stroh, Late Night Assistant Editor In training

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*Keywords in **Bold** are regular mentions in each issue.*

Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

[1]

This is a gross oversimplification and I'm sure I get some critical details of this wrong. Please don't overreact telling me how badly I got this characterization wrong.